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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/587,339	09/07/2006	Graham Goodwin	5129.155	4828

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DUNLAP CODDING, P.C. - MILLENNIUM
P.O. BOX 16370
OKLAHOMA CITY, OK 73113

EXAMINER	
LIAO, DIANA J	
ART UNIT	PAPER NUMBER
1793	

MAIL DATE	DELIVERY MODE
06/23/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/587,339	GOODWIN ET AL.	
	Examiner	Art Unit	
	DIANA J. LIAO	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 March 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4,6,9 and 10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4,6,9 and 10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1, 4, 6, 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayakawa, et al. (US 6,165,256) in view of Okusako, et al. (US 2002/0077251).

Hayakawa ‘256 teaches a composition containing photocatalytic particles of metallic oxide, a silicon-based component and a solvent. (claim 1) The photocatalytic particles may be anatase titanium oxide, with a crystallite diameter of 100nm or less. (claims 2 and 3) The upper limit is more preferably 20 or 10 nm, and the lower limit 3 nm. (col 7, lines 31-36) The crystallite diameter is interpreted to be equivalent to particle diameter. Hayakawa ‘256 teaches ranges both within and overlapping with that of the claimed ranges, anticipating the range and also creating a *prima facie* case of

obviousness. The silica-based component may be a precursor capable of forming a film, such as a hydrolyzable siloxane. One preferred precursor is a derivative of the general formula R_pSiX_{4-p}. R is preferably an alkyl group having 1-18 carbon atoms or a phenyl group. (col 8, lines 27-40) The silica-based component is meant to help immobilize the photocatalyst to a surface. (col 7, lines 48-50) A preferred additional component may be a material with a refractive index of less than 2. Examples include calcium carbonate and magnesium carbonate. (col 10, lines 10-25) The total content of the photocatalytic powder and silicon should be between 0.01 and 5 wt.%. The composition may suffer from haze development or interference fringes if more than 5 wt.% of solids is used. (col 9, lines 27-43) Though this is the weight percentage of both the photocatalytic oxide and silicon in the composition, the range still overlaps with that of the prior art since the photocatalytic particles could constitute any amount of the range in Hayakawa '256. In addition, even though the additional carbonate components are not included in this weight percentage specifically, since the general teachings are drawn to solids content, Hayakawa '256 suggests that the extra solid components should also be included in the general less than 5 wt.%

In the event that the crystallite diameter does not directly relate to a particle size, Hayakawa '256 teaches that this is a composition for a coating. If silica is contained in the composition, the particles are of the size of 1-100nm, 5-50nm, or more preferably 8-20nm. (col 7, lines 48-55) Since a coating should be uniform and the silica is meant to hold the photocatalyst into place, it would have been obvious to one of ordinary skill in the art to employ photocatalyst particles of the same magnitude of size.

Regarding the identity of a siloxane, the instant claims appear to require a compound with 3 silicon atoms while Hayakawa '256 generally teaches derivatives of one silicon atom. However, these compounds are meant to be hydrolyzed and thus combined. Thus since they are still the same class of siloxane compounds, containing R groups of the same nature, the claimed polysiloxanes and siloxane compounds in Hayakawa '256 are found to be obvious alternatives of one another.

Regarding particles having a de-HNO_3 ability, Hayakawa '256 teaches using calcium carbonate or magnesium carbonate as an additive. Although the de-HNO_3 ability is not taught, it is found inherent because it is defined in the claim as a suitable material. The use of particles is also not explicitly taught. However, amongst other suitable materials with a refractive index of under 2, are materials such as quartz sand, metal oxides, and clays. These types of materials only exist in solid form, and quartz sand would especially suggest a particulate form. Additionally, since the other components are present as particulates, it would have been easier to create a coating with other particle components to create an easily mixable slurry.

Hayakawa '256 is silent regarding the surface area of the titanium oxide particles.

It would have been obvious to one of ordinary skill in the art to use particles of high surface area in order to obtain a greater active area.

Additionally, regarding surface area and the inclusion of alkaline earth carbonates, Okusako '251 teaches the creation of a photocatalytic composition comprising anatase titanium dioxide and a metal-containing compound. The anatase crystalline size is of about 10 nm or larger. The photocatalyst has a surface area of at least 55 m^2/g. (claim 1) When the surface area is less than 55 m^2/g the photocatalytic activity tends to be lowered. (para. 28) The metal-containing compound may be a basic compound, such as a carbonate of an alkaline-earth metal such as calcium or magnesium. (para. 23) The metal-containing compound may be present in a variety of configurations, in an amount of at least 0.05% by mole based on the amount of titanium. However, when the metal-containing compound is present in excess, the photocatalytic activity becomes lowered. (para 25) The basic compounds are able to decompose compounds such as hydrogen sulfide or acetic acid. It is not clear why the addition of metal containing compounds increases photocatalytic activity in visible light. (para. 26)

Okusako ‘251 teaches that the surface area is critical to the photocatalytic activity, and that it would have been desirable to increase the surface area. Okusako '251 also teaches that the inclusion of compounds such as calcium or magnesium carbonate is beneficial, though for different reasons than stated in Hayakawa ‘256. Okusako ‘251 thus provides further motivation to have a large surface area, and to include calcium and magnesium carbonate.

Regarding the amount of carbonate, Okusako ‘251 teaches that too much of an additional compound may decrease the photocatalytic ability of the titanium oxide.

Therefore, it would have been obvious to one of ordinary skill in the art to optimize the amount of carbonate, or de-HNO_3 particles, in the composition.

Response to Arguments

4. Applicant's arguments with respect to claims 1-4, 6, 9 and 10 have been considered but are moot in view of the new ground(s) of rejection.

Applicants argue that basic metal-containing compounds would not necessarily decompose HNO_3. Applicants also argue that the calcium or magnesium carbonate does not have to be in intimate contact with the titanium oxide as in Okusako '251. As taught in Okusako '251, the basic metal containing compounds are capable of decomposing other acids, which is significant reason to believe that it would decompose nitric acid. The claims also now recite calcium carbonate or magnesium carbonate to be suitable compounds, which also provides reason to believe that a de-HNO_3 ability is inherently present if those compounds are present. The claims also do not exclude the intimate contact between the photocatalytic particles and de-HNO_3 particles, so whether or not it is necessary is not relevant. Applicant argues that the adhering of the de-HNO_3 particles to the titanium dioxide particles would render the catalyst ineffective, but there is no evidence of this. The claims are also drawn to a composition which is capable of forming a coating. Whether or not this coating would withstand rainfall, or any sort of durability considerations, were not taken into account since it is not required by the instant claims.

Applicants argue that Okusano '251 does not teach the particle size of the photocatalytic particles, and it does not teach a silicon containing compound, or the concentration.

Hayakawa '256 is now applied as stated in the above rejection to teach these limitations.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DIANA J. LIAO whose telephone number is (571)270-

3592. The examiner can normally be reached on Monday - Friday 8:00am to 5:30pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 571-272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ngoc-Yen M. Nguyen/
Primary Examiner, Art Unit 1793

DJL